



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,831	02/18/2002	Sanh Dang Tang	MIO 0018 V2/96-1138.03	8095

7590 07/30/2003
Killworth, Gottman, Hagan & Schaeff, L.L.P.
One Dayton Centre, Suite 500
Dayton, OH 45402-2023

EXAMINER

ESTRADA, MICHELLE

ART UNIT PAPER NUMBER

2823

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/078,831

Applicant(s)

TANG, SANH DANG

Examiner

Michelle Estrada

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Blalock (5,320,981) and Wu (5,940,731).

Blalock discloses a substrate (12); a layer of dielectric material (14) formed on at least a portion of said substrate; a layer of conductive material (10) formed within said layer of dielectric material; a layer of etch resistant material such as a photoresist; at least a portion of said layer of dielectric material and said layer of etch resistant material each having openings therein defining a via, said via exposing at least a portion of said layer of conductive material (Col. 4, lines 30-35 and Fig. 2); wherein said layer of conductive material contacts at least a portion of said substrate.

Wu does not disclose a layer of hard mask material formed on at least a portion of said layer of dielectric material; said layer of dielectric material including a pair of shoulders having hard mask material thereon, and said layer of hard mask material having a pair of facets.

Wu discloses a dielectric layer (14) having a via; a hard mask layer (28) formed on at least a portion of said layer of dielectric material; said layer of dielectric material

including a pair of shoulders (34) having hard mask material thereon of polycrystalline silicon, and said layer of hard mask material having a pair of facets (See Fig. 6); and an interconnect material (72) in said via.

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Blalock and Wu to enable formation of the interconnect structure.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Blalock (5,320,981) and Wu (5,940,731) as applied to claims 1-6 and 8 above, and further in view of Linn et al. (5,547,896)

The combination of Blalock and Wu does not disclose that the hard mask material comprises a titanium-tungsten alloy.

Linn et al. disclose titanium-tungsten alloy as a suitable material for a hard mask layer (Col. 3, line 9).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Blalock, Wu and Linn et al. to enable formation of the hard mask layer.

Response to Arguments

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir.

Art Unit: 2823

1986). Wu was relied on for the teaching of making the sidewall spacers of polycrystalline silicon. The polycrystalline silicon was re-deposited as layer 52 and forming sidewall spacers 58.


Applicant argues that Blalock teaches no shoulders on his dielectric material, nor does he teach forming facets on a hard mask layer. However, Blalock was not relied on upon for that purpose.

Applicant argues that Wu forms polysilicon spacers by depositing a second polysilicon layer 28 and then anisotropically etching, and that the shoulders of the present invention are formed by re-depositing hard mask material which was previously removed in an etch step. However, Wu forms shoulders 58 by re-depositing a polysilicon layer 52 (hard mask), which was previously removed as layer 28.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


George Fourson
Primary Examiner
Art Unit 2823


MEstrada
July 17, 2003